

Claims

[c1] We claim:

1.A method for forming a light emitting diode comprising following steps:

forming a first stack;

forming a second reaction layer over said first stack;

forming a second stack;

forming a first reaction layer over said second stack;

holding together said first reaction layer and said second reaction layer by means of a transparent adhesive layer.

[c2] 2.The method of claim 1 wherein the step of forming a first stack comprises following steps:

providing a first substrate;

forming a second contact layer on the first substrate;

forming a second cladding layer on the second contact layer;

forming an emitting layer on the second cladding layer;

forming a first cladding layer on the emitting layer;

forming a first contact layer on the first cladding layer;

and

forming a transparent conductive layer on the first contact layer.

- [c3] 3.The method of claim 2 further comprising following steps:
removing the first substrate;
etching the second contact layer, the second cladding layer, the emitting layer, first cladding layer, and the first contact layer; and
forming a first electrode on the second contact layer, and a second electrode on the transparent conductive layer.
- [c4] 4.The method of claim 2 wherein the first substrate comprises at least one material selected from a group consisting of GaP, GaAs, and Ge.
- [c5] 5.The method of claim 2 wherein the first contact layer and the second contact layer each comprise at least one material selected from a group consisting of GaP, GaAs, GaAsP, InGaP, AlGaInP, and AlGaAs.
- [c6] 6.The method of claim 2 wherein the first cladding layer, the emitting layer, and the second cladding layer each comprise AlGaInP.
- [c7] 7.The method of claim 2 wherein the transparent conductive layer comprises at least one material selected from a group consisting of indium tin oxide, cadmium tin oxide, antimony tin oxide, zincoxide, zinc tin oxide,

BeAu, GeAu, and Ni/Au.

- [c8] 8.The method of claim 1 wherein the first and second reaction layers each comprise at least one material selected from a group consisting of SiNx, Ti, and Cr.
- [c9] 9.The method of claim 1 wherein the transparent adhesive layer comprises at least one material selected from a group consisting of PI, BCB, and PFCB.
- [c10] 10.The method of claim 1 wherein forming a second stack comprises forming a second substrate.
- [c11] 11.The method of claim 10 wherein the second substrate comprises at least one material selected from a group consisting of SiC, Al₂O₃, glass materials, quartz, GaP, GaAsP, and AlGaAs.
- [c12] 12.The method of claim 1 wherein said first reaction layer and said second reaction layer are held together with the transparent adhesive layer by chemical bonds.
- [c13] 13.The method of claim 12 wherein the chemical bonds are hydrogen bonds or ionic bonds.
- [c14] 14.A light emitting diode comprising:
 - a first stack;
 - a second reaction layer formed on the first stack;
 - a second stack;

a first reaction layer formed on the second stack;
a transparent adhesive layer formed between the first and second reaction layers; and
a first electrode and a second electrode formed on the first stack.

[c15] 15. The light emitting diode of claim 14 wherein the first stack comprises:

a transparent conductive layer formed on the second reaction layer, the transparent conductive layer having a first surface area and a second surface area;

a first contact layer formed on the first surface area of the transparent conductive layer;

a first cladding layer formed on the first contact layer;

an emitting layer formed on the first cladding layer;

a second cladding layer formed on the emitting layer;

and

a second contact layer formed on the second cladding layer;

wherein the first electrode is formed on the second contact layer, and the second electrode is formed on the second surface area of the transparent conductive layer.

[c16] 16. The light emitting diode of claim 15 wherein the first contact layer and the second contact layer each comprise at least one material selected from a group consisting of GaP, GaAs, GaAsP, InGaP, AlGaInP, and AlGaAs.

- [c17] 17.The light emitting diode of claim 15 wherein the first cladding layer, the emitting layer, and the second cladding layer each comprise AlGaInP.
- [c18] 18.The light emitting diode of claim 15 wherein the transparent conductive layer comprises at least one material selected from a group consisting of indium tin oxide, cadmium tin oxide, antimony tin oxide, zinc oxide, zinc tin oxide, BeAu, GeAu, and Ni/Au.
- [c19] 19.The light emitting diode of claim 14 wherein the first and second reaction layers each comprise at least one material selected from a group consisting of SiNx, Ti, and Cr.
- [c20] 20.The light emitting diode of claim 14 wherein the transparent adhesive layer comprises at least one material selected from a group consisting of PI, BCB, and PFCB.
- [c21] 21.The light emitting diode of claim 14 wherein the second stack comprises a second substrate, the first reaction layer being formed on the second substrate.
- [c22] 22.The light emitting diode of claim 21 wherein the second substrate comprises at least one material selected from a group consisting of SiC, Al₂O₃, glass materials,

quartz, GaP, GaAsP, and AlGaAs.